EUCHNER

Operating Instructions

Non-Contact Safety Switch

CES-I-AP-.-C04-... (Unicode/Multicode)

EN

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1. About this document

1.1. Scope

These operating instructions are valid for all CES-I-AP-.-C04-…. These operating instructions, the document “Safety information and maintenance” and any enclosed data sheet form the complete user information for your device.

1.2. Target group

Design engineers and installation planners for safety devices on machines, as well as setup and servicing staff possessing special expertise in handling safety components.

1.3. Key to symbols

Symbol/depiction	Significance
	Printed document
	Document is available for download at www.euchner.de
	Document on CD
DANGER **WARNING** **CAUTION**	Safety precautions **Danger** of death or severe injuries **Warning** about possible injuries **Caution** minor injuries possible
NOTICE **Important!**	**Notice** about possible device damage **Important** information
Tip	Tip/useful information

1.4. Supplementary documents

The overall documentation for this device consists of the following documents:

Document title (document number)	Contents	
Safety information and maintenance CES-I-AP (091181)	Basic information on safe setup and service	
Operating instructions (115159)	(this document)	
Possibly enclosed data sheet	Item-specific information about deviations or additions	

Important!

Always read all documents to gain a complete overview of safe installation, setup and use of the device. The documents can be downloaded from www.euchner.de. For this purpose enter the doc. no. in the search box.

2. Correct use

Safety switches series CES-I-AP are interlocking devices without guard locking (type 4). The device complies with the requirements according to EN IEC 60947-5-3. Devices with unicode evaluation possess a high coding level; devices with multicode evaluation feature a low coding level.

In combination with a movable safety guard and the machine control, this safety component prevents dangerous machine functions from occurring while the safety guard is open. A stop command is triggered if the safety guard is opened during the dangerous machine function.

This means:

- Starting commands that cause a dangerous machine function must become active only when the safety guard is closed.
- Opening the safety guard triggers a stop command.
- Closing a safety guard must not cause automatic starting of a dangerous machine function. A separate start command must be issued. For exceptions, refer to EN ISO 12100 or relevant C-standards.

Before the device is used, a risk assessment must be performed on the machine, e.g. in accordance with the following standards:

- EN ISO 13849-1, Safety of machinery – Safety-related parts of control systems – Part 1: General principles for design
- EN ISO 12100, Safety of machinery – General principles for design – Risk assessment and risk reduction
- IEC 62061, Safety of machinery – Functional safety of safety-related electrical, electronic and programmable electronic control systems

Correct use includes observing the relevant requirements for installation and operation, particularly based on the following standards:

- EN ISO 13849-1, Safety of machinery – Safety-related parts of control systems – Part 1: General principles for design
- EN ISO 14119 (supersedes EN 1088), Safety of machinery – Interlocking devices associated with guards – Principles for design and selection
- EN 60204-1, Safety of machinery – Electrical equipment of machines – Part 1: General requirements

The safety switch is only allowed to be operated in conjunction with the intended CES actuators from EUCHNER and the related connection components from EUCHNER. On the use of different actuators or other connection components, EUCHNER provides no warranty for safe function.

Important!

- The user is responsible for the proper integration of the device into a safe overall system. For this purpose, the overall system must be validated, e.g. in accordance with EN ISO 13849-2.
- It is only allowed to use components that are permissible in accordance with the table below.

Table 1: Possible combinations for CES components

Safety switch	Actuator	
	CES-A-BBN-C04-115271	CES-A-BDN-06-104730
CES-I-AP-.-C04-...	●	●

Key to symbols	●	Combination possible

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3. Description of the safety function

Devices from this series feature the following safety functions:

Monitoring of the safety guard position
(interlocking device according to EN ISO 14119)

- Safety function:
  - The safety outputs are switched off when the safety guard is open (see chapter *6.4. Switching states on page 7*).
- Safety characteristics: category, Performance Level, PFH_d (see chapter *11. Technical data on page 17*).

4. Exclusion of liability and warranty

In case of failure to comply with the conditions for correct use stated above, or if the safety instructions are not followed, or if any servicing is not performed as required, liability will be excluded and the warranty void.

5. General safety instructions

Safety switches fulfill personal protection functions. Incorrect installation or tampering can lead to fatal injuries to personnel.

Check the safe function of the safety guard particularly

- after any setup work
- after the replacement of a system component
- after an extended period without use
- after every fault

Independent of these checks, the safe function of the safety guard should be checked at suitable intervals as part of the maintenance schedule.

WARNING

Danger to life due to improper installation or due to bypassing (tampering). Safety components perform a personal protection function.

- Safety components must not be bypassed, turned away, removed or otherwise rendered ineffective. On this topic pay attention in particular to the measures for reducing the possibility of bypassing according to EN ISO 14119:2013, section 7.
- The switching operation must be triggered only by actuators designated for this purpose.
- Prevent bypassing by means of replacement actuators (only for multicode evaluation). For this purpose, restrict access to actuators and to keys for releases, for example.
- Mounting, electrical connection and setup only by authorized personnel possessing the following knowledge:
  - specialist knowledge in handling safety components
  - knowledge about the applicable EMC regulations
  - knowledge about the applicable regulations on occupational safety and accident prevention.

Important!

Prior to use, read the operating instructions and keep these in a safe place. Ensure the operating instructions are always available during mounting, setup and servicing. EUCHNER cannot provide any warranty in relation to the readability of the CD for the storage period required. For this reason you should archive a printed copy of the operating instructions. You can download the operating instructions from www.euchner.de.

6. Function

The safety switch monitors the position of movable safety guards. The safety outputs are switched on/off when the actuator moves into/out of the operating distance.

The system consists of the following components: coded actuator (transponder) and switch.

Whether the complete actuator code of the device is taught in (unicode) or not (multicode) depends on the respective version.

- **Devices with unicode evaluation**: The actuator must be assigned to the safety switch by a teach-in operation so that it is detected by the system. This unambiguous assignment ensures a particularly high level of protection against tampering. The system thereby possesses a high coding level.
- **Devices with multicode evaluation**: Unlike systems with unique code detection, on multicode devices a specific code is not polled but instead it is only checked whether the actuator is of a type that can be detected by the system (multicode detection). There is no exact comparison of the actuator code with the taught-in code in the safety switch (unique code detection). The system possesses a low coding level.

When the safety guard is closed, the actuator is moved towards the safety switch. When the switch-on distance is reached, power is supplied to the actuator via the switch and data transfer takes place.

If a permissible code is detected, the safety outputs are switched on.

The safety outputs are switched off when the safety guard is opened.

In the event of a fault in the safety switch, the safety outputs are switched off and the DIA LED illuminates red. The occurrence of faults is detected at the latest on the next demand to close the safety outputs (e.g. on starting).

6.1. Door monitoring output

The door monitoring output is switched on as soon as a valid actuator is detected in the operating distance.

6.2. Diagnostics output

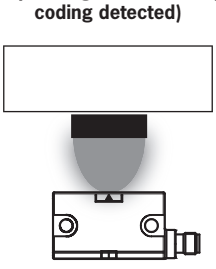
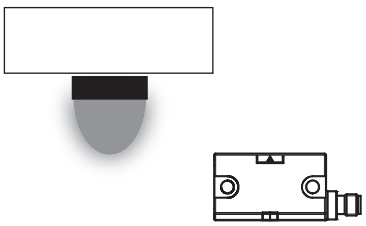
The diagnostics output is switched on in the event of a fault (switch-on condition as for DIA LED).

6.3. Limit-range monitoring

If the safety door with the actuator should settle over time, the actuator can drift out of the read head operating distance. The device recognizes this situation and indicates that the actuator is in the limit range by flashing the STATE LED. This allows the safety door to be readjusted in time. Also see chapter *10. System status table CES-I-AP-... on page 16*.

6.4. Switching states

The detailed switching states for your switch can be found in the system status table. All safety outputs, monitoring outputs and indicating LEDs are described there.

	Safety guard closed (actuator in operating distance and permissible coding detected)	**Safety guard open (actuator not in operating distance)**
		
Safety outputs FO1A and FO1B	on	off
Monitoring output OD	on	off

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7. Mounting

CAUTION

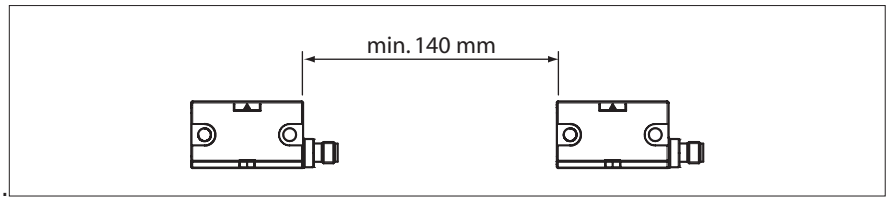
Safety switches must not be bypassed (bridging of contacts), turned away, removed or otherwise rendered ineffective.

- Observe EN ISO 14119:2013, section 7, for information about reducing the possibilities for bypassing an interlocking device.

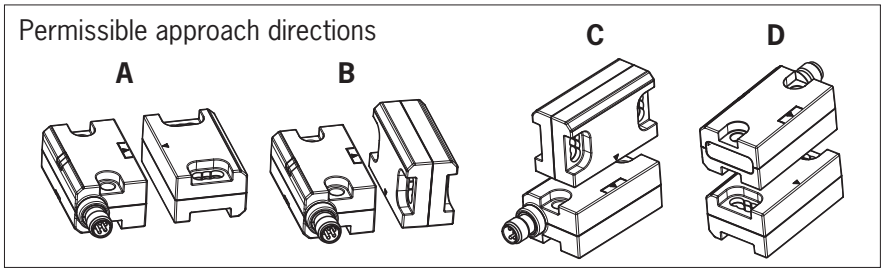
NOTICE

Risk of damage to equipment and malfunctions as a result of incorrect installation.

- Safety switches and actuators must not be used as an end stop.
- Observe EN ISO 14119:2013, sections 5.2 and 5.3, for information about fastening the safety switch and the actuator.
- From the assured switch-off distance S_{ar}, the safety outputs are safely shut down.
- When mounting several safety switches, observe the stipulated minimum distance to avoid mutual interference.



- The operating distance changes during the mounting of the actuator as a function of the material used for the safety guard.
- Observe direction of arrow on the device (see figure below).



Note the following points:

- Actuator and safety switch must be easily accessible for inspection and replacement.
- Actuator and safety switch must be fitted so that
  - the front faces are at the minimum switch-on distance 0.8 x S_{ao} or closer when the safety guard is closed. To avoid entering the area of possible side lobes, a minimum distance is to be maintained in case of a side approach direction. See chapter *11. Technical data,* section *Typical operating distance* of the respective actuator.
  - when the safety guard is open up to the distance S_{ar} (assured switch-off distance), a hazard is excluded.
  - the actuator is positively mounted on the safety guard, e.g. by using the safety screws included.
  - they cannot be removed or tampered with using simple means.
- Pay attention to the maximum tightening torque for the read head or safety switch and actuator mountings of 0.8 Nm.
- In order to avoid damage, the connection cable must be laid with protection in areas in which high-pressure cleaners are used.

8. Electrical connection

WARNING

In case of an error, loss of the safety function through incorrect connection.

- To ensure safety, both safety outputs must always be evaluated.
- Monitoring outputs must not be used as safety outputs.
- Lay the connection cables with protection to prevent the risk of short circuits.

CAUTION

Risk of damage to equipment or malfunctions as a result of incorrect connection.

- The device generates its own clock signal on the output lines FO1A/FO1B. A downstream control system must tolerate these pulses, which may have a length of up to 0.3 ms. No clock pulses are output when the safety outputs are switched off.
- The inputs on an evaluation unit connected must be positive-switching, as the two outputs on the safety switch deliver a level of +24 V in the switched-on state.
- All the electrical connections must either be isolated from the mains supply by a safety transformer according to IEC 61558-2-6 with limited output voltage in the event of a fault, or by other equivalent isolation measures (PELV).
- All electrical outputs must have an adequate protective circuit for inductive loads. The outputs must be protected with a free-wheeling diode for this purpose. RC interference suppression units must not be used.
- Power devices which are a powerful source of interference must be installed in a separate location away from the input and output circuits for signal processing. The cable routing for safety circuits should be as far away as possible from the cables of the power circuits.
- In order to avoid EMC interference, the physical environmental and operating conditions at the installation site of the device must comply with the requirements according to the standard EN 60204-1:2006, section 4.4.2 (EMC).
- Please pay attention to any interference fields in case of devices such as frequency converters or induction heating systems. Observe the EMC instructions in the manuals from the respective manufacturer.

Important!

If the device does not appear to function when operating voltage is applied (e.g. green STATE LED does not flash), the safety switch must be returned unopened to the manufacturer.

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8.1. Notes about c UL us

Important!

- For use and operation as per the c UL us requirements [1], a power supply with the feature “for use in class 2 circuits” must be used.
  Alternative solutions must comply with the following requirements:
  a) Electrically isolated power supply unit with a max. open-circuit voltage of 30 V DC and a limited current of max. 8 A.
  b) Electrically isolated power supply unit in combination with fuse as per UL248. This fuse should be designed for max. 3.3 A and should be integrated into the 30 V DC voltage section.
- For use and applications as per the requirements of c UL us [1], a connection cable listed under the UL category code CYJV2 or CYJV must be used.

1) Note on the scope of the UL approval: The devices are tested according to the requirements of UL508 and CSA/C22.2 no. 14 (protection against electric shock and fire).

8.2. Safety in case of faults

- The operating voltage U_B is reverse polarity protected.
- The safety outputs are short circuit-proof.
- A short circuit between the safety outputs is detected by the switch.
- A short circuit in the cable can be excluded by laying the cable with protection.

8.3. Fuse protection for power supply

The power supply must be provided with fuse protection depending on the number of switches and current required for the outputs. The following rules apply:

Max. current consumption of an individual switch I_{max}

I_{max} = I_{UB} + I_{OD} + I_{FO1A}+$_{FO1B}$

I_{UB} = Switch operating current (35 mA)

I_{OD} = Load current of monitoring output (max. 50 mA)

$I_{FO1A+FO1B}$ = Load current of safety outputs FO1A + FO1B (2 x max. 150 mA)

8.4. Requirements for connection cables

CAUTION

Risk of damage to equipment or malfunctions as a result of incorrect connection cables.

- Use connection components and connection cables from EUCHNER.
- On the usage of other connection components, the requirements in the following table apply. EUCHNER provides no warranty for safe function in case of failure to comply with these requirements.
- Please observe the maximum cable length of 200 m.

Observe the following requirements with respect to the connection cables:

Parameter	Value	Unit
Conductor cross-section min.	0.14 ... 0.34	mm²
R max.	150	Ω/km
C max.	120	nF/km
L max.	0.65	mH/km
Recommended cable type	5x0.34 mm²	

8.5. Connector assignment of safety switch CES-I-AP-.-C04

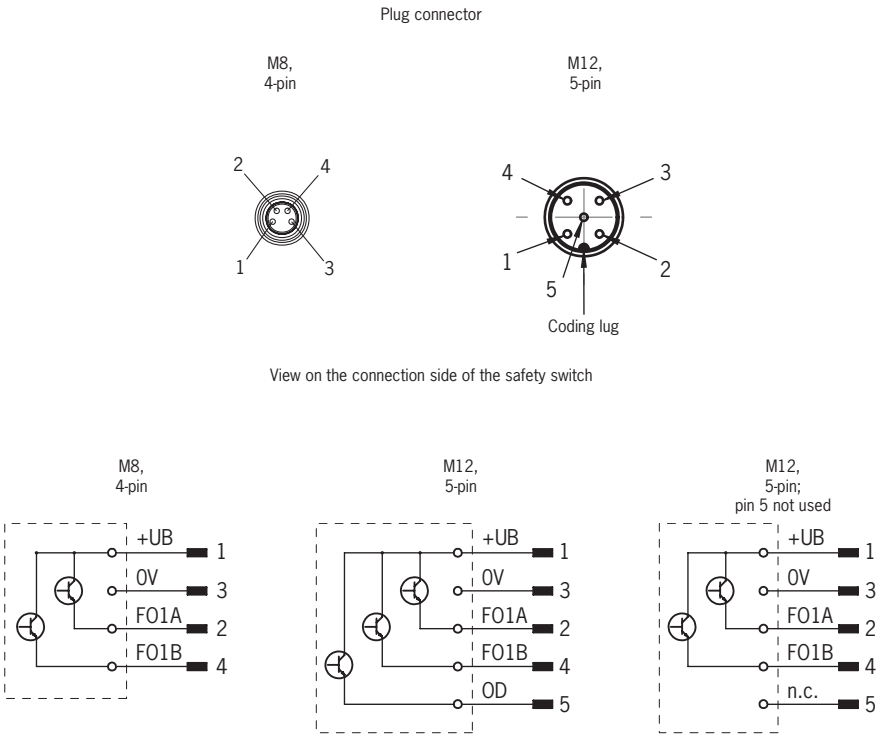

Figure 1: Connector assignment of safety switch CES-I-AP-.-C04

Plug connector pin			Designation	Description	Wire color as per DIN 47100
M8	M12				
4-pin	5-pin	5-pin; pin 5 not used			
1	1	1	UB	Power supply, DC 24 V	BN
2	2	2	FO1A	Safety output, channel 1	WH
3	3	3	0V	Ground, DC 0 V	BU
4	4	4	FO1B	Safety output, channel 2	BK
-	5	-	OD	Monitoring output	GY

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8.6. Connection

WARNING

In case of an error, loss of the safety function through incorrect connection.

- To ensure safety, both safety outputs (FO1A and FO1B) must always be evaluated.

Important!

The example shows only an excerpt that is relevant for connection of the CES system. The example illustrated here does not show complete system planning. The user is responsible for safe integration in the overall system. Detailed application examples can be found at www.euchner.de. Simply enter the order number of your switch in the search box. All available connection examples for the device can be found under “Downloads.”

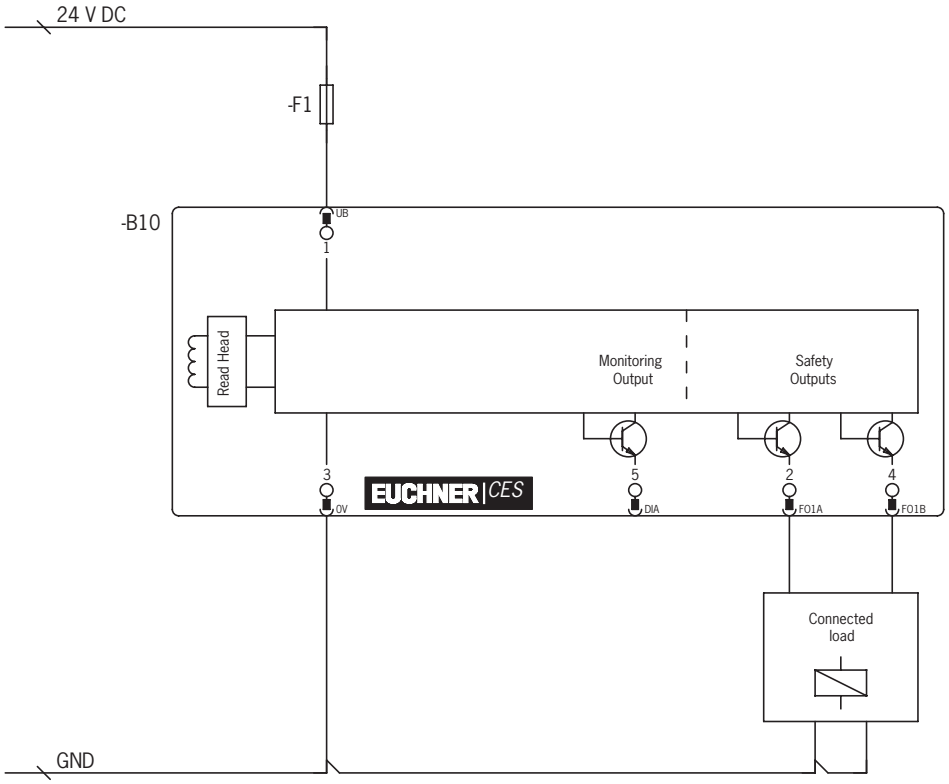

Figure 2: Connection example CES-I-AP-...

8.7. Notes on operation with safe control systems

Please observe the following requirements for connection to safe control systems:

- Use a common power supply for the control system and the connected safety switches.
- The device tolerates voltage interruptions on UB of up to 5 ms. Tap the supply voltage directly from the power supply unit. If the supply voltage is connected to a terminal of a safe control system, this output must provide sufficient electrical current.
- The safety outputs (FO1A and FO1B) can be connected to the safe inputs of a control system. Prerequisite: The input must be suitable for pulsed safety signals (OSSD signals, e.g. from light curtains). The control system must tolerate test pulses on the input signals. This normally can be set up by parameter assignment in the control system. Observe the notes of the control system manufacturer. For the pulse duration of your safety switch, please refer to chapter *11. Technical data on page 17*.

A detailed example of connecting and setting the parameters of the control system is available for many devices at www.euchner.de in the area Download » Applications » CES. The features of the respective device are dealt with there in greater detail.

8.8. Devices for direct connection to IP65 field modules

The version CES-I-AP-...-SI-... (M12, 5-pin; pin 5 not assigned) is optimized for connection to decentralized peripheral systems with M12 plug connector, such as the ET200pro series from Siemens. The devices are parameterized and connected like an OSSD (e.g. like light curtains).

If flying leads are used, connection to IP20 input and output modules (e.g. ET200s) is naturally also possible.

Important!

Observe the following notes prior to connection:

- Parameter assignment must be performed for the input/output modules (see application example at www.euchner.de, in the area Download ➡ Applications ➡ CES).
- Additionally observe notes from the control system manufacturer where necessary.

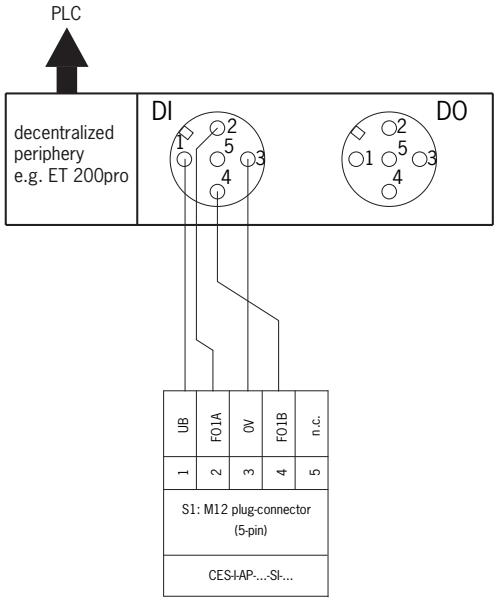

Figure 3: Connection example for connection to decentralized peripheral systems

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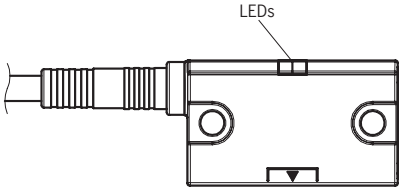
9. Setup

9.1. LED indicators

You will find a detailed description of the signal functions in chapter *10. System status table CES-I-AP-... on page 16.*

LED	Color
STATE	Green
DIA	Red



9.2. Teach-in function for actuator (only for unicode evaluation)

The actuator must be allocated to the safety switch using a teach-in function before the system forms a functional unit.

During a teach-in operation, the safety outputs and the monitoring output OD are switched off, i.e. the system is in the safe state.

Important!

- The teach-in operation may be performed only if the device functions flawlessly. The red DIA LED must not be illuminated.
- The safety switch disables the code of the previous actuator if teach-in is carried out for a new actuator. Teach-in is not possible again immediately for this actuator if a new teach-in operation is carried out. The disabled code is released again in the safety switch only after a third code has been taught-in.
- The safety switch can only be operated with the last actuator taught-in.
- After starting, the device remains in teach-in standby state for 3 min. If no new actuator is detected in this time, the device changes to normal state. If the switch detects the actuator that was most recently taught when in teach-in standby state, this state is ended immediately and the switch changes to normal state.
- If the actuator to be taught in is within the operating distance for less than 60 s, it will not be activated and the most recently taught in actuator will remain saved.

9.2.1. Preparing device for the teach-in operation and teaching in actuator

1. Apply operating voltage to the safety switch.

➡ A self-test is performed for approx. 0.5 s. After this, the LED flashes cyclically three times and signals that it is in standby state for teach-in.
Standby state for teach-in remains active for approx. 3 minutes.

2. Move new actuator to the read head (observe distance < S_{ao}).

➡ Teach-in operation starts, green LED flashes (approx. 1 Hz). During teach-in, the safety switch checks whether the actuator is a disabled actuator. Provided this is not the case, the teach-in operation is completed after approx. 60 seconds, and the green LED goes out. The new code has now been stored, and the old code is disabled.

3. To activate the new actuator code from the teach-in operation in the safety switch, the operating voltage to the safety switch must then be switched off for min. 3 seconds.

9.3. Functional check

⚠	**WARNING** Danger of fatal injury as a result of errors in installation and functional check. ‣ Before carrying out the functional check, make sure that there are no persons in the danger area. ‣ Observe the valid accident prevention regulations.

9.3.1. Electrical function test

After installation and any fault, the safety function must be fully checked. Proceed as follows:

1. Switch on operating voltage.

➡ The machine must not start automatically.

➡ The safety switch carries out a self-test. The green STATE LED then flashes at regular intervals.

2. Close all safety guards.

➡ The machine must not start automatically.

➡ The green STATE LED illuminates continuously.

3. Enable operation in the control system.
4. Open the safety guard.

‣ The machine must switch off and it must not be possible to start it as long as the safety guard is open.
‣ The green STATE LED flashes at regular intervals.

Repeat steps 2 - 4 for each safety guard.

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10. System status table CES-I-AP-...

Operating mode	Actuator/door position	Safety outputs FO1A and FO1B	Monitoring output OD	LED indicator, output STATE (green)	LED indicator, output DIA (red)	State
Normal operation	closed	on	on	☀	○	Normal operation, door closed
	closed	on	on	☀ flashing quickly	○	Normal operation, door closed, actuator in limit range ➡ re-adjust door
	open	off	off	☀ 1 x	○	Normal operation, door open, no actuator taught
Teach-in operation (only unicode)	open	off	off	☀ 3 x	○	Door open, unit is ready for teach-in for another actuator (only short time after power-up)
	closed	off	off	☀ 1 Hz	○	Teach-in operation
	X	off	off	○	○	Positive acknowledgment after completion of teach-in operation
Fault display	closed	off	off	☀ 3 x	☀	Defective actuator (e.g. fault in code or code not readable)
	X	off	off	☀ 4 x	☀	Output fault (e.g. short circuits, loss of switching ability)
	X	off	off	○	☀	- Internal fault (e.g. component faulty, data error) - Fault on the power supply (e.g. shutdown pulse duration for pulsed power supply too long)

Key to symbols	○	LED not illuminated
	☀	LED illuminated
	☀ 10 Hz (8 s)	LED flashes for 8 seconds at 10 Hz
	☀ 3 x	LED flashes three times, and this is then repeated
	X	Any state

11. Technical data

NOTICE

If a product data sheet is included with the product, the information on the data sheet applies.

11.1. Technical data of safety switch CES-I-AP-.-C04-...

Parameter		Value			Unit
		min.	typ.	max.	
Housing material			Plastic PBT		
Dimensions			42 x 25 x 18		
Weight (device without connection cable)			0.04		kg
Ambient temperature at U_B = DC 24 V		- 25	-	+ 65	°C
Storage temperature		- 40	-	+ 70	
Degree of protection acc. to EN IEC 60529			IP67 IP69K (only version with flying lead and version with plug connector M8 and mating connector with the same degree of protection)		
Safety class			III		
Degree of contamination			3		
Installation position			Any		
Installation method			Non-flush		
Connection			- Plug connector M8, 4-pin or - Connection cable PUR, 0.25 mm², with plug connector M12, 5-pin, or - Connection cable PUR with flying lead, 5 x 0.25 mm²		
Operating voltage U_B (regulated, residual ripple < 5%)			24 ± 15% (PELV)		V DC
Current consumption			35		mA
External fuse (operating voltage)		0.25	-	8	A
Safety outputs FO1A/FO1B			Semiconductor outputs, p-switching, short circuit-proof		
- Output voltage U(FO1A)/U(FO1B) 1)					
HIGH	U(FO1A)	U_B-1.5	-	U_B	V DC
HIGH	U(FO1B)				
LOW	U(FO1A)/U(FO1B)	0		1	
Switching current per safety output		1	-	150	mA
Utilization category according to EN IEC 60947-5-2			DC-13 24 V 150 mA Caution: outputs must be protected with a free-wheeling diode in case of inductive loads.		
Off-state current I_r 2)			≤ 0.25		mA
Monitoring output DIA 1)			p-switching, short circuit-proof		
- Output voltage		0.8 x U_B	-	U_B	V DC
- Max. load		-	-	50	mA
Rated insulation voltage U_i		-	-	300	V
Rated impulse withstand voltage U_{imp}		-	-	1.5	kV
Resilience to vibration			In acc. with EN IEC 60947-5-2		
Switching frequency		-	-	1	Hz
Repeat accuracy R acc. to EN IEC 60947-5-2			≤ 10		%
EMC protection requirements			In acc. with EN IEC 60947-5-3 and EN IEC 61326-3-1		
Ready delay		-	0.5	-	s
Risk time		-	-	260	ms
Switch-on time		-	-	300	ms
Discrepancy time		-	-	10	ms
Test-pulse duration			300		µs
Test pulse interval			100		ms
Reliability values according to EN ISO 13849-1					
Category			4		
Performance Level			PL e		
PFH_d			4.1×10^{-9} / h		
Mission time			20		years

1) Values at a switching current of 50 mA without taking into account the cable length.
2) Maximum current at an output in switched-off state.

EN

11.1.1. Typical system times

Please refer to the technical data for the exact values.

Ready delay: After switching on, the unit carries out a self-test. The system is ready for operation only after this time.

Switch-off time of safety outputs: The max. reaction time t_{on} is the time from the moment when the actuator is in the operating distance to the moment when the safety outputs switch on.

Risk time according to EN 60947-5-3: If an actuator moves outside the operating distance, the safety outputs (FO1A and FO1B) are switched off after the risk time at the latest.

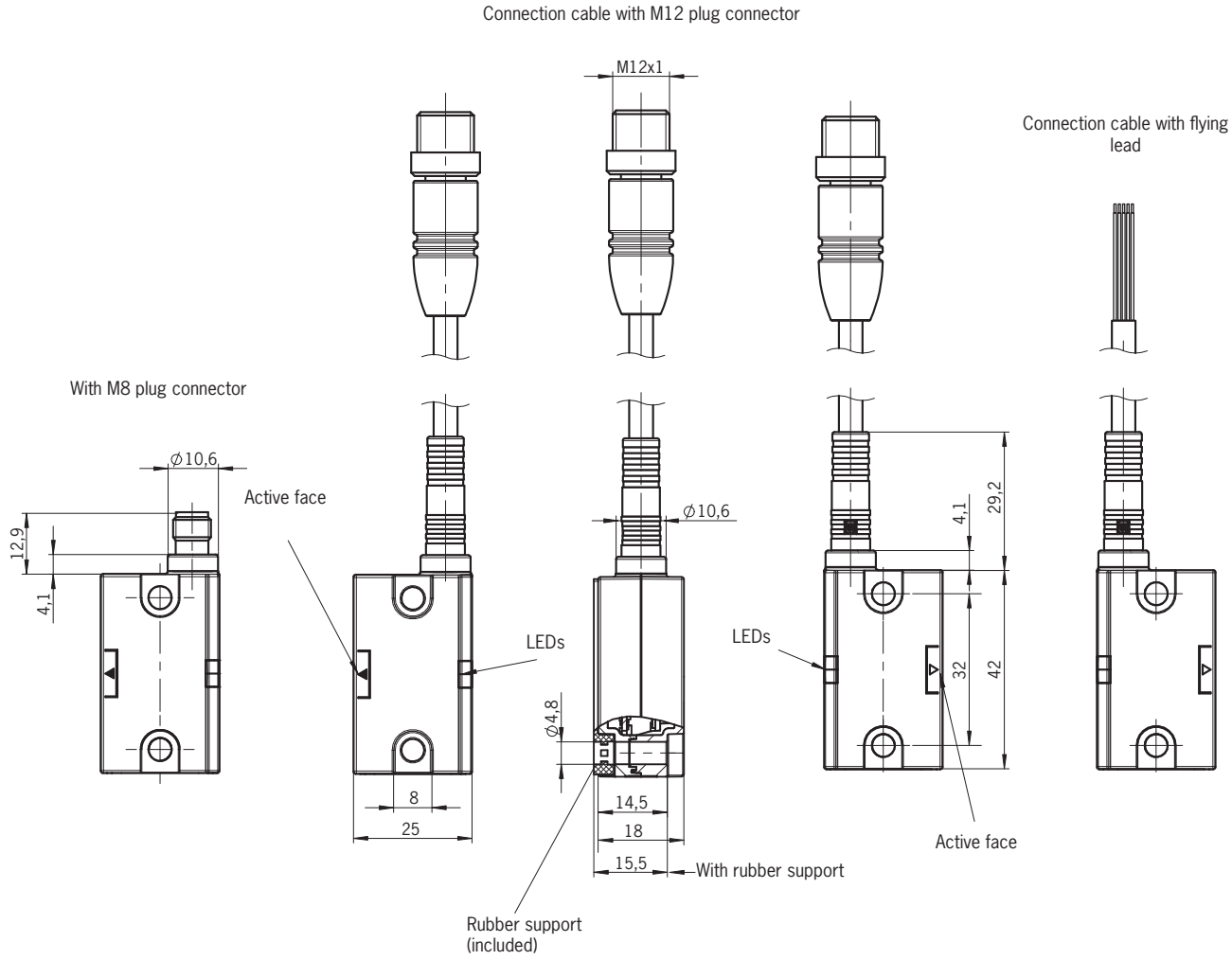
Discrepancy time: The safety outputs (FO1A and FO1B) switch with a slight time offset. They assume the same signal state at the latest after the discrepancy time.

Test pulses at the safety outputs: The device generates its own test pulses on the safety outputs (FO1A and FO1B). A downstream control system must tolerate these test pulses.

This can usually be set up in the control systems by parameter assignment. If parameter assignment is not possible for your control system or if shorter test pulses are required, please contact our support organization.

The test pulses are only output if the safety outputs are switched on.

11.1.2. Dimension drawing of safety switch CES-I-AP-C04-...

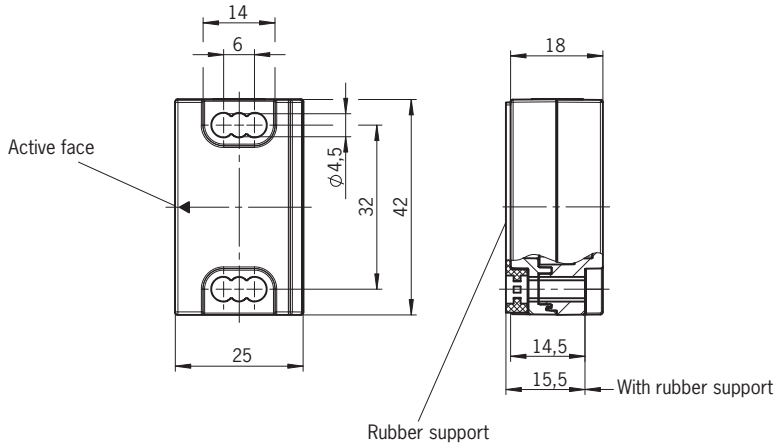


EN

11.2. Technical data of actuator CES-A-BBN-C04

Parameter	Value min.	Value typ.	Value max.	Unit
Housing material		Plastic PBT		
Dimensions		42 x 25 x 18		mm
Weight		0.03		kg
Ambient temperature	- 40	-	+ 65	°C
Degree of protection		IP67/IP69K		
Installation position		Active face opposite read head		
Power supply		Inductive via read head		

11.2.1. Dimension drawing

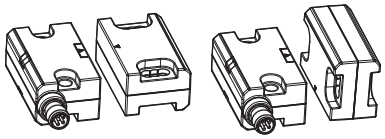


NOTICE

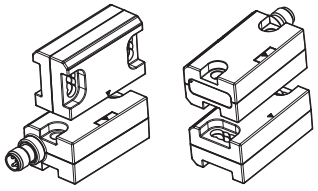
- 2 safety screws M4x20 included.
- Rubber support included.

11.2.2. Operating distances

Operating distance for center offset m = 0

Approach direction A	Approach direction B	Parameter	Value min.	Value typ.	Value max.	Unit
		Switch-on distance	-	15	-	mm
		Assured switch-on distance s_{ao} 1)	10	-	-	
		Switching hysteresis 1)	1	2	-	
		Assured switch-off distance s_{ar} - in x/z direction - in y direction	 - -	 - -	 40 60	

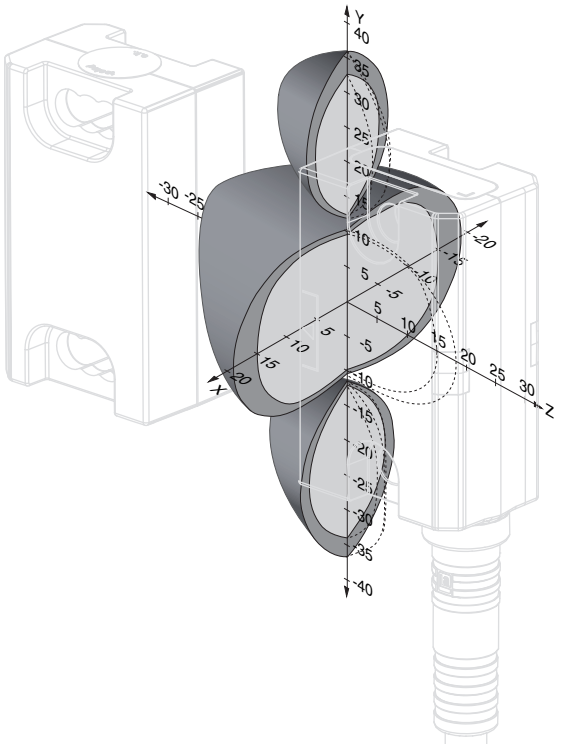
1) On approach in Z direction

Approach direction C	Approach direction D	Parameter	Value min.	Value typ.	Value max.	Unit
		Switch-on distance	-	11	-	mm
		Assured switch-on distance s_{ao} 1)	6	-	-	
		Switching hysteresis 1)	1	2	-	
		Assured switch-off distance s_{ar} - in x/z direction - in y direction	 - -	 - -	 40 60	

1) On approach in x direction

11.2.3. Typical operating distance in approach direction A

(only in combination with actuator CES-A-BBN-C04)



For a side approach direction (y direction) for the actuator and safety switch, a minimum distance of s = 6 mm must be maintained so that the operating distance of the side lobes is not entered.

Figure 4: Typical operating distance

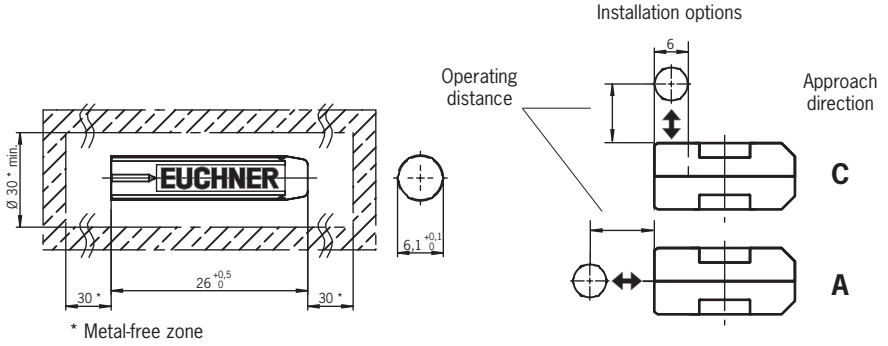
EN

11.3. Technical data of actuator CES-A-BDN-06

Parameter	Value			Unit
	min.	typ.	max.	
Housing material	Macromelt PA-based plastic			
Dimensions	26 x ∅ 6			mm
Weight	0.005			kg
Ambient temperature	- 40	-	+ 70	°C
Degree of protection acc. to EN IEC 60529	IP 67 / IP 69K 1)			
Installation position	Active face opposite read head			
Power supply	Inductive via read head			

1) With flush installation

11.3.1. Dimension drawing

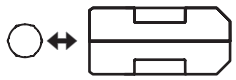


CAUTION

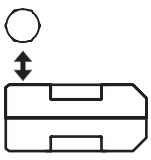
- Do not mount at temperatures below 0 °C.
- The actuator can be damaged during mounting.

11.3.2. Operating distances

Operating distance for center offset m = 0

Approach direction	Parameter	Value			Unit
A		min.	typ.	max.	
	Switch-on distance	-	19	-	mm
	Assured switch-on distance s_{ao} 1)	14	-	-	
	Switching hysteresis 1)	-	2	-	
	Assured switch-off distance s_{ar} - in x/z direction - in y direction	 - -	 - -	 40 60	

1) The values apply to surface installation of the actuator

Approach direction	Parameter	Value			Unit
C		min.	typ.	max.	
	Switch-on distance	-	15	-	mm
	Assured switch-on distance s_{ao} 1)	10	-	-	
	Switching hysteresis 1)	-	2	-	
	Assured switch-off distance s_{ar} - in x/z direction - in y direction	 - -	 - -	 40 60	

1) The values apply to surface installation of the actuator

12. Ordering information and accessories

Tip!

Suitable accessories, such as cables or installation material, can be found at www.euchner.de. Simply enter the order number of your item in the search box and open the item view. “Accessories” contains accessories that can be combined with the item.

13. Inspection and service

WARNING

Loss of the safety function because of damage to the system.
- In case of damage, the entire device must be replaced.
- Only accessories or spare parts that can be ordered from EUCHNER may be replaced.

Regular inspection of the following is necessary to ensure trouble-free long-term operation:
- Check the switching function (see chapter *9.3. Functional check on page 15*)
- Check the secure fastening of the devices and the connections
- Check for soiling

No servicing is required. Repairs to the device are only allowed to be made by the manufacturer.

NOTICE

The year of manufacture can be seen in the lower right corner of the rating plate. The current version number in the format (VX.X.X) can also be found on the device.

14. Service

If service support is required, please contact:

EUCHNER GmbH + Co. KG

Kohlhammerstraße 16

D-70771 Leinfelden-Echterdingen

Service telephone:

+49 711 7597-500

E-mail:

support@euchner.de

Internet:

www.euchner.de

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15. Declaration of conformity

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EUCHNER GmbH + Co. KG
Kohlhammerstraße 16
70771 Leinfelden-Echterdingen
Germany

EG-Konformitätserklärung
EC-Declaration of Conformity
CE-Déclaration de Conformité
CE-Dichiarazione di conformità
CE-Declaración de Conformidad

Original DE
Translation EN
Traduction FR
Traduzione IT
Traducción ES

109923-09 –01/15

Die nachfolgend aufgeführten Produkte sind konform mit den Anforderungen der folgenden Richtlinien (falls zutreffend):
The beneath listed products are in conformity with the requirements of the following directives (if applicable):
Les produits mentionnés ci-dessous sont conformes aux exigences imposées par les directives suivantes (si valable)
I prodotti sotto elencati sono conformi alle direttive sotto riportate (dove applicabili):
Los productos listados a continuación son conforme a los requisitos de las siguientes directivas (si fueran aplicables):

I:	2006/42/EG	Maschinenrichtlinie
	2006/42/EC	*Machinery directive*
	2006/42/CE	*Directive Machines*
	2006/42/CE	*Direttiva Macchine*
	2006/42/CE	*Directiva de máquinas*
II:	2004/108/EG	EMV Richtlinie
	2004/108/EC	*EMC Directive*
	2004/108/CE	*Directive de Compatibilité électromagnétique*
	2004/108/CE	*Direttiva EMV*
	2004/108/CE	*Directiva CEM*

Die Schutzziele der Niederspannungsrichtlinie wurden gemäß Anhang I, Nr. 1.5.1 der Maschinenrichtlinie eingehalten.
The safety objetives of the Low-Voltage Directive comply with Annex I, No. 1.5.1 of the Machinery Directive.
Les objectifs de sécurité de la Directive Basse Tension sont conformes à l'annexe I, No. 1.5.1 de la Directive Machines
Gli obiettivi di sicurezza della Direttiva Bassa Tensione sono conformi a quanto riportato all'allegato I, No. 1.5.1 della Direttiva Macchine.
Los objetivos de seguridad de la Directiva de Bajo Voltaje cumplen con el Anexo I, No. 1.5.1 de la Directiva de Máquinas

Folgende Normen sind angewandt:	a:	EN 60947-5-3:1999 + A1:2005
Following standards are used:	b:	EN 1088:1995 + A2:2008 till 2015-04-30 / EN ISO 14119:2013 from 2015-05-01
Les normes suivantes sont appliquées:	c:	EN ISO 13849-1:2008
Vengono applicate le seguenti norme:	d:	EN ISO 13849-2:2012
Se utilizan los siguientes estándares:	e:	EN 62026-2:2013 (ASi)

Bezeichnung der Sicherheitsbauteile *Description of safety components* *Description des composants sécurité* *Descrizione dei componenti di sicurezza* *Descripción de componentes de seguridad*	**Type** *Type* *Type* *Tipo* *Typo*	**Richtlinie** *Directives* *Directive* *Direttiva* *Directivas*	**Normen** *Standards* *Normes* *Norme* *Estándares*	**Zertifikats-Nr.** *No. of certificate* *Numéro du certificat* *Numero del certificato* *Número del certificado*
Sicherheitsschalter *Safety Switches* *Interrupteurs de sécurité* *Finecorsa di sicurezza* *Interruptores de seguridad*	CES-AP-CL2-AH-SF CES-AP-CR2-AH-SF CES-AP-CL2-CH-SF CES-AP-CR2-CH-SF CES-AP-CL2-AH-SB CES-AP-CR2-AH-SB CES-AP-CL2-CH-SB CES-AP-CR2-CH-SB CES-AP-CL2-AH-Lxx CES-AP-CR2-AH-Lxx CES-AP-CL2-CH-Lxx CES-AP-CR2-CH-Lxx	I, II	a, b, c, d	ET 12056
	CES-AP-C01-CH-SA	I, II	a, b, c, d	ET 12084
	CES-AR-C01-AH-SA CES-AR-C01-CH-SA CES-AR-C01-EH-SA	I, II	a, b, c, d	ET 12084
	CES-AR-CL2-AH-SA CES-AR-CR2-AH-SA CES-AR-CL2-CH-SA CES-AR-CR2-CH-SA CES-AR-CL2-AH-SG CES-AR-CR2-AH-SG CES-AR-CL2-CH-SG CES-AR-CR2-CH-SG CES-AR-CL2-AH-Lxx CES-AR-CR2-AH-Lxx CES-AR-CL2-CH-Lxx CES-AR-CR2-CH-Lxx	I, II	a, b, c, d	ET 12066

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Bezeichnung der Sicherheitsbauteile *Description of safety components* *Description des composants sécurité* *Descrizione dei componenti di sicurezza* *Descripción de componentes de seguridad*	**Type** *Type* *Type* *Tipo* *Typo*	**Richtlinie** *Directives* *Directive* *Direttiva* *Directivas*	**Normen** *Standards* *Normes* *Norme* *Estándares*	**Zertifikats-Nr.** *No. of certificate* *Numéro du certificat* *Numero del certificato* *Número del certificado*
Betätiger *Actuator* *Actionneur* Azionatore *Actuador*	CES-A-BLN-L2 CES-A-BLN-R2 CES-A-BLN-U2 CES-A-BDN-06	I, II	a, b, c, d	ET 12056 ET 12066
	CES-A-BBA CES-A-BCA CES-A-BPA CES-A-BDA-20 CES-A-BRB CES-A-BRN	I, II	a, b, c, d	ET 12084 ET 10147

Benannte Stelle *Notified Body* *Organisme notifié* *Sede indicata* *Entidad citada*	NB 0340 DGUV Test Prüf- und Zertifizierungsstelle Fachausschuss Elektrotechnik Gustav-Heinemann-Ufer 130 50968 Köln Germany

Bezeichnung der Sicherheitsbauteile *Description of safety components* *Description des composants sécurité* *Descrizione dei componenti di sicurezza* *Descripción de componentes de seguridad*	**Type** *Type* *Type* *Tipo* *Typo*	**Richtlinie** *Directives* *Directive* *Direttiva* *Directivas*	**Normen** *Standards* *Normes* *Norma* *Estándares*	**Prüfbericht** *Test report* *Rapport du test* *Rapporto di prova* *Informe de prueba*
Sicherheitsschalter *Safety Switches* *Interrupteurs de sécurité* *Finecorsa di sicurezza* *Interruptores de seguridad*	CES-AH-C.3...	I, II	a, b, c, d	Euchner QS PB 21/2010
	CES-AP-C.1...	I, II	a, b, c, d	Euchner QS PB 76/2010
	CES-I-AP...C04... CES-I-AR...C04...	I, II	a, b, c, d	UQS 116783 (*) UQS 119733 (*)
	CES-I-AS2A...C04...	I, II	a, b, c, d, e	UQS 120552 (*)
	CES-FD-AP...	I, II	a, b, c, d	UQS 116784 (*)
Auswertegerät *Safety Unit* *Analyseur* *Centralina* *Unidad de evaluación*	CES-AR-AES-12	I, II	a, b, c, d	Euchner QS PB 53/2007

Benannte Stelle *Notified Body* *Organisme notifié* *Sede indicata* *Entidad citada*	(*) 0035 TÜV Rheinland Industrie Service GmbH Am Grauen Stein - 51105 Köln - Germany

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